DOCUMENT RESUME

ED 176 401 EA 012 127

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TITLE The Case for Internal Linkage: Functional Intergration Within the Organization.
PUB DATE Apr 79
NOTE 32p.; Paper presented at the Annual Meeting of the American Educational Research Association (San Francisco, California, April 8-12, 1979)

EDRS PRICE MF01/PC02 Plus Postage.
DESCRIPTORS *Change Agents; *Educational Improvement; *Educational Innovation; Elementary Secondary Education; *Information Dissemination; Information Utilization; School Systems
IDENTIFIERS *Linking Agents

ABSTRACT

This paper discusses the increasing attention given recently to change theory and knowledge utilization in education and to the development of dissemination mechanisms in educational systems. Also discussed are the concept of "linkage," a process of connecting users with resources in an efficacious way, and the role of linkage agent, a person who helps to bring this about. The paper argues that internal linkage agents are more effective in educational systems than external agents, and it attempts to clarify the theoretical and the operational meaning of the term "linkage" as it is being used in educational dissemination and diffusion activities. The paper concludes that knowledge utilization is more than a matter of convenience or desirability. It is a critical matter that relates directly to an organization's survival and its ability to achieve its goals. (Author/LD)

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THE CASE FOR INTERNAL LINKAGE: FUNCTIONAL INTERGRATION WITHIN THE ORGANIZATION

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I. The Issue

Haughey (1979) notes that the term "linkage" is so broadly defined in education and covers such a wide range of activities that the whole area abounds in ambiguity. One purpose of the symposium is to try to reduce this ambiguity and to give "linkage" a narrower and more widely understood meaning.

In this paper, I will use "linkage" to refer to a process of promoting knowledge utilization in educational organizations, and a "linkage agent" is an individual or group which causes linkage to occur. Knowledge utilization, in turn, is concerned with knowledge development, dissemination and implementation (Human, 1976, p.2). These activities have no particular value per se, but as the discussion below will demonstrate, the use of knowledge is, because of the times in which we live, a critical matter. The survival of particular institutions, and indeed of whole societies, may be determined by their success in using knowledge.

This paper represents an attempt to make the case for "internal linkage,"that is, for the placement of linkage agents within the organizations they are intended to serve. The paper is in four general parts: it sets the context; it establishes why linkage is an important matter and makes a theoretical argument for internal linkage in social organizations; it discusses applications of these ideas in education; and, finally, it presents some empirical data which support the argument.

Presented at the Annual Convention of the American Educational Research Association, San Francisco, California, April, 1979.

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We are not talking about something trivial or even of just moderate importance. Boulding (1964) assures us of this with his dramatic comment that, "Our precious little planet, this blue-green cradle of life whith its rosy mantle, is in one of the most critical stages, perhaps the most critical stage of its whole existence" (p. 192). A significant element of this situation is what Boulding refers to as the "entropy trap," and dealing with this depends directly on the use of knowledge (pp. 137- 155).

What does knowledge do in organization? In the most fundamental sense, particular knowledge elements, used properly, provide an organization the ability to neutralize the entropy trap -- that is, to cope with challenges from its environment and thus to have the stability to engage in goal-directed behavior. "Knowledge," in general, can be defined as the body of facts possessed by a culture. Information, a closely related term, is the symbolization of some subset of the knowledge base, that is, a set of symbols which operationally defines some knowledge subset for particular individuals. Knowledge is moved from one location to another through the mechanism of information and its transmission. Knowledge utilization involves the transmission of information which increases an organization's ability to cope with environmental challenges.

"Information" is defined technically as the reduction of uncertainty (Miller, 1975, p. 281). A set of facts (a knowledge component) exists in one location and is to be moved to another. To the extent that uncertainty is reduced at the receiving end as to the content and "meaning" of the set of facts, information has been transmitted.

These definitions seem rather routine and do not have about them the air of urgency in the quotation by Boulding. The argument for internal linkage, as presented in this paper, depends partly on the accuracy of Boulding's assessment, so the general context needs to be set before the basic elements of argument are presented.

The basic premise of the paper may be stated as follows:

> In the current environment, internal linkage agents are more effective in inducing knowledge utilization in education systems, other things equal, than are external linkage agents; and, in general, the relative advantage of the internal linkage agent varies directly with the turbulence of a system's environment.

II. The Context

Environment is a key concept in this propostiion. To begin the argument, consider the current condition of society and of education.

A. The Great Transition: A Source of Continuing Turbulence

There is little doubt that world culture is moving into a new era, from the Industrial Revolution, with its emphasis on machines and their ability to convert energy into work, to the Age of Information (or the Age of Technology), in which the emphasis will range from automatic control of machines to the literal expansion of man's intellectual capabilities (Bell, 1973).

Boulding (1964) is among those who believe that this era is one of the great transition periods in human history. He states that:

> ... civilization is in an intermediate state of man dividing the million or so years of precivilized society from an equally long or longer period which we may expect to extend into the future post-civilization. It is ... a rather disagreeable state for most people living in it... (p. 2).

The change occurring in our time is related primarily to human learning and to the production and use of knowledge. In the recorded history of human kind, the amount of knowledge grew at a very slow rate until very recently. Thousands of years passed with virtually no increase in the knowledge base, and changes in human society were slow. The rate of knowledge growth (and of change) began to increase at about the time of the renaissance, and it continued to grow slowly as the scientific method was developed. It picked up in the twentieth century, and has now reached such enormous proportions that the amount of knowledge produced in a single decade exceeds all of that produced in the first 6,000 years of recorded history (Cornish, 1977, pp. 1-20).

One of the key characteristics of our time is the rapid rate of change. Wildavsky states that the extent of cultural change in the last quarter century has been "astounding--phenomenal--remarkable" (1979 , p. 36), and Kauffman concludes that it "may be pushing us to

the limits of both individual and institutional adaptability" (1976, p. 7). Toffler, in his famous book, speculates that the increasing rate of change causes "future shock," that is, psychological disorientation in which people no longer feel certain of anything (1970).

In the midst of this, we are bombarded by the mass media with predictions of disaster, with the result, as Wildavshy (1979) notes, that "The richest, longest-lived, best-protected, most resourceful civilization, with the highest degree of insight into its own technology, is on its way to becoming the most frightened" (p. 32). Dwelling on the dangers produces what Heilbroner (1975) refers to as an "oppressive anticipation of the future" (p. 14), with accompanying feelings of anxiety, alienation, and helplessness, and such symptoms as cynicism, increased crime, and other anti-social behavior.

The impact of the great transitions on societal institutions and accompanying educational needs is already greater than might be imagined. Consider, for example, the "knowledge industry," which comprises all activities relating to the production, distribution, and utilization of knowledge in all its forms and includes:

- Fundamental and applied scientific research and development
- Education and training
- The mass media, including publishing, the press, radio, and television
- Computers and their applications

For the last twenty five years, the knowledge industry in the U. S. has grown at a rate roughly twice that of the gross national product. As early as 1958, it absorbed 29 percent of the GNP. By 1963, it accounted for about 33 percent of the GNP; in 1968, it was approaching 40 percent; and it is expected to increase at a yearly rate of at least seven percent between now and 1985. By then, it will have exceeded 50 percent of the GNP, and all signs suggest that it will continue to expand at a similar rate until the turn of the century and beyond (Anderla, 1973).

For the society, the years immediately ahead -- to the turn of the century and beyond -- are certain to be painful, difficult, and dangerous. Among the relevant factors are:

- Any review of recent articles in newspapers and news magazines reveals a loss of assurance with respect to the course of social

events (Sidney, 1979, p. 16). There is a loss of faith in the future (Wildavsky, 1979) and in the belief that man has the power to make things better (Bowman, 1978, p. 144). Many economic and social problems are proving to lie outside the scope of accustomed instrumentalities of social change. There is the "stunning discovery that economic growth carries previously unsuspected side effects whose cumulative impact may be more deleterious than the undoubted benefits... (Heilbroner, 1975, p. 19)."

. The situation poses a grave threat to basic democratic values. The necessity for strict control in the use of energy and other resources, in the preservation of the environment and in limiting population and other growth, challenges the viability of self- determination. People may not voluntarily exercise the self- discipline necessary to maintain a free society. Hielbroner notes "the disappointing failures of capitalist societies to create atmospheres of social harmony, even in expansive settings," and suggests that the only workable alternative may be severe authoritarian regimes (1975, pp. 90-91).

. There is no doubt that the danger is real, and the temptation to discount it and go about business-as-usual is an invitation to disaster. Other great societies have disintegrated, and there is no assurance that this one will not follow suit. Similarities to other periods are disquieting. Order is giving way to disorder, self-confidence to self-doubt, and moral certitude to moral disquiet.

B. The Crisis in Education

The difficulties of society obviously have enormous implications for education, and, as might be expected, the education system in the United States is in a crisis of its own. The problems of schools are often perceived narrowly as related only to the schools and the people who run them, but they are really a part of the general displacement in this period of convulsive change. As Commanger (1975) points out, "schools... are the instruments and mirrors of society" (p. 13).

In a January, 1979,article, Fred Heckinger states that, "Public

Education in the United States is in mortal danger... Not within recent memory have the public schools had so few friends or so many detractors" (p. 20).

The critics of education have had a field day in recent years, claiming that the educational system cannot cope with the challenges it faces. Many people agree with Frans and Howard (1974) that, "Though the world is in transition to a post-industrial society, our school systems are still busy preparing students for a 19th century industrial world" (p. 29).

Some Indicators of the Crisis. Statistics which substantiate that there is indeed a crisis in education abound. For example:

- The cost of public schooling has shot up 150 percent in the past decade (Heckinger, 1979, p. 20).
- Achievements have been declining, as documented by a steady drop in the college-admission test scores (ibid). Declines on the Scholastic Aptitude Test (SAT) and in National Assessment of Educational Progress results have been widely publicized. American students score considerable lower on achievement tests than students from other industrially-advanced nations --21 points lower in math than students in Germany, 25 points below students in Japan, and 31 points below British students (Neill, 1979, p. 341).
- An estimated 13 percent of all high school graduates are functional illiterates (ibid).
- Thirty million adult Americans are functionally incompetent, and 20 million over the age of 16 cannot read well enough to understand a want ad (Neill, 1979, p, 341).
- The U.S. illiteracy rate is three times higher than that of the Soviet Union (ibid).
- Many prospective teachers are not truly literate. For example, one third of applications for teaching jobs failed an eighth-grade general knowledge test in Florida in 1976 (ibid).
- There is an increase in the general alienation of youth.
  - -- Between 1950 and 1975 the annual suicide rate of white youths between the ages of 15 and 19 increased 171 percent, from 2.8 deaths for each 100,000 to 7.6. No other age group had so high an increase (Wynne, 1978, p.308).

--There is evidence of increased drug use by the young (ibid).

--There is also an increase in use of alcohol by youths. In 1974, 23 percent of a national sample of youths between the ages of 13 and 18 reported being drunk four or more times during the past year (ibid, p. 309).

--Between 1950 and 1975 the estimated number of illigetimate births for unmarried white females, aged 15 to 19, went from 5.1 per 1,000 to 12.1. This increase in illegitimacy has occurred during a period characrerized by increasing availability of contraceptives, abortion, and sexual information (ibid.).

--Delinquency has increased sharply. Between 1957 and 1974 the number of delinquency cases per 1,000 persons aged 10 to 17 disposed of by American juvenile courts rose from 19.9 to 37.5 (ibid.). In a recent survey, involving a national sample of schools, assaults on teachers were reported to have increased 85 percent between 1970 and 1973. During the same period the number of weapons confiscated from students by authorities in the schools surveyed rose by 54 percent (ibid.).

. There are indications of a national decline in confidence in the public schools. When asked in a Gallup Poll to give a grade to the public schools, 18 percent of respondents in 1974 assigned an A, while only nine percent assigned an A in 1978. Those giving a satisfactory (A or B) rating declined from 48 percent to 36 percent during this period. Six percent assigned a D in 1974; 11 percent assigned D in 1978 (Lewis, 1978, p. 40).

No one can read these and other depressing facts and fail to realize that the problem is of major proportions. Goodlad speculates that "... given the circumstances surrounding schooling today and what is needed to effect improvement, we--that is, our society--may not be up to it. Indeed, given certain of these circumstances and conditions, our schools may deteriorate and dissatisfaction and disaffection may increase" (1979, p. 342).

The Dangers of Continued Decline. One of the first requirements, if the decline of public education is to be reversed, is that the educator's themselves must be willing to look ahead, be willing to

engage in widespread dialog, and be prepared for fundamental change. They must be willing to discuss and plan at the philosophical level.

Whether this can happen is, of couse, a prime question. As Goodland (1979) notes... "the less tenable long-established principles come to be, the more intense the ceremonial rain dances by those who fear the personal consequences of new ones. That is, threatened groups and individuals try harder to do what gave satisfaction before, however, inappropriate and outworn the behaviors may be" (p. 345).

The consequences of failure to look ahead and change, however, are ominous. In one likely scenario for the future, the public schools become a third-rate institution which serve primarily the poorest and most deprived.

The elements to bring about this possibility are present. Home computers are on the market, and projections are that half of the households in the country will have a computer by 1985. Computerized games, which are effective teaching devices in their own right, are already big business, and their potential has barely been tapped. The companies which manufacture those items have decided to bypass the schools and appeal directly to the home market, and they are succeeding (Lewis, 1979). Within a short time, combinations of these and some of the other communications technologies, such as fibre optics, will make it possible for a learner to develop all needed cognitive skills in the home. Cost factors will place this educational alternative within reach of middle-income parents.

As this possibility becomes a reality, an attack on compulsary attendance laws is under way (World Confederation, 1978, p. 258). Heckinger (1979) notes that both the new left and the new right would like to do away with compulsory education (p. 20), and courts are beginning to set the precedent by ruling that educating children at home is permissible (Arkansas Gazette, 1979, p. 14a).

If this scenario should be played out, and there are indications that it is a real possibility, then one of the keystones to the American concept of democracy would be severely weakened. At stake, says Heckinger (1979), is the difference between a fluid and a stratified society, a society with two edcuational strata, rigidly divided along lines of class and wealth. "At the end of that road is the graveyard of the American dream" (p. 22).

The threat to education is real and frightening. Four general areas of need must be satisfied if the public education system is to be preserved.

1. More attention must be given to and resources invested in philosophical/normative planning in education. As Soderberg (1979) has indicated, this change is imperative. It is a prerequisite to the other need areas discussed below, and it may be the most difficult of all to bring about because it flies in the face of decades of ingrained habit. The potential for harmful, unwanted outcomes is too great to allow events to drift and chance to control.
2. There must be reform, in the sense of a redefinition of the role of the schools and other parts of the formal education system. New technological developments, the economics related to them, and the necessity of imparting more knowledge must be taken seriously into account. "Recurring" or lifetime learning is becoming a necessity for a large majority of the population (Markley, 1974). More and more of the work force will be replaced in routine jobs by automatic machines and will have to be retrained to occupy some segment of the knowledge industry, and those in this industry will have to have their own knowledge and skills periodically upgraded (Bowman, 1978, p. 101). Questions must be answered as to the part of this learning that is to be (can be) the responsibility of the formal public educational systems, the part that other institutions are to play, and the responsibility the individual is to assume for his own advanced education. To meet the challenges of the future, these issues must be resolved in a way that a learning society -- in which life long learning is a reality -- is effected (Lewis, 1978).
3. The educational system must be conceived and treated as an interrelated component of the larger society. We are learning more and more that the schools are locked into a total social environment that influences them in many ways and severely limits their powers. The difficulties of the larger society, as the transition into the technological age proceeds, are transferred to and impact education.

> The more science advances us, the more we come to realize the seamless web that is man and nature, the internal relationship of things... The world around us is not neatly compartmentalized: it comes as a whole package, made up of interrelated components, each part of which affects other parts. That means we cannot simply muddle through, concentrating only on the problem immediately before us (Peterson, 1979, p. 29).

In working through its concerns, education must analyze and interact consciously with larger social, economic, environmental, and political systems. The types of issues now faced cannot be addressed successfully on a piecemeal basis or in isolation from other actors. While subject more than most professions to public scrutiny and ostensibly under public control through boards of education, the schools have nevertheless tended to view narrowly their opportunities for cooperation with other societal institutions and to respond defensively to claims of their inadequacy. A more holistic approach, which recognizes and acts on the mutual-dependence among different educational systems and between education and other societal institutions, must be initiated.

4. <u>There must be wider involvement in decisions about what the formal education system is to be and about the way it is to perform in society</u>. A great deal is being written these days about the growth of government and about its impingement into our lives. Wildavsky (1979) suggests that this is more than just the empire-building urge in action. He notes that, in this era of the knowledge explosion, as it becomes more and more difficult for the ordinary person to understand the forces in action, there is a growing tendency to rely on experts and to let the government decide what risks there are and which are to be taken. The Jeffersonian concept of an informed electorate becomes more and more difficult, for the simple reason that no one can be informed on all of the technical and other matters which are relevant. Relying on experts does not solve the problem. The experts do not agree among themselves about effects of technology (Wildavsky, 1979, p. 32), and they are not morally qualified to decide what risks the rest of us should take. The effects of current actions have long-lasting future

consequences, and the interests of future generations have to be considered. But who can determine the answers to questions such as:

> By what right... does anyone enrich himself by endangering future generations? By what right, it may be asked in return, does anyone impoverish the future by denying it choice? What would you have to believe about the future to sacrifice the present to it (ibid., p. 34)?

These are moral, normative questions that only the society at large is qualified to answer, and unless ways can be found to bring the general populace meaningfully and intelligently into the determination of such issues, participatory democracy is in mortal danger. One of the great dilemmas of this era is that, at the same time that the rate of change necessitates quicker and more far-ranging decisions than ever before, the nature of the decisions makes intelligent consideration of them by the ordinary person extremely difficult.

III. The Informational Behavior of Systems, and Its Relationship to Environmental Threats

Effects of Different Types of Environments. The times in which we live constitue a clear threat to the educational system; it is being challenged by its environment. Emery and Trist (1973), conceptualize four general types of environments, and their fourth type, the "turbulent field," appears to correspond to conditions facing education today. In a turbulent field, the accelerating rate and complexity of interactive effects exceeds the component systems' capacities for prediction and, hence, control of the compounding consequences of their actions.

For organizations, these trends mean a gross increase in their

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* The other three types are "placid, randomized," in which desirable and undesirable features are relatively unchanging and are randomly distributed; "placid, clustered," in which desirable and undesirable features are relatively unchanging in themselves but clustered; and "disturbed-reactive," in which there are other, competing systems in the field which interact with each other and with the referent system.

> area of relevant uncertainty. The consequences which flow from their actions lead off in ways that become increasingly unpredictable...lines of action that are strongly pursued may find themselves attenuated by emergent field forces (p. 171).

In these types of environments individual organizations, however large, cannot expect to adapt successfully simply through their own direct actions. Their very survival is often threatened, and even if they can maintain sufficient stability to remain viable, they are unable to pursue their goals very successfully.

Requisite Variety and the Use of Information. To meet this type of situation and to maintain the ability to engage successfully in goal-directed behavior, a social system must bring in information from the environment and use it in particular ways. To understand the reasons for this and its functioning, the concept "variety" needs to be considered.

Ashby (1968a, 1968b) outlined the "Law of Requisite Variety." Buckley (1968) defines it as follows:

> ... variety within a system must be at least as great as the environmental variety against which it is attempting to regulate itself... A requisite of sociocultural systems is the development and maintenance of a significant level of non-pathological deviance manifest as a pool of alternate ideas and behaviors with respect to the traditional, institutionalized ideologies and role behaviors. Rigidification of any given institutional structure must eventually lead to disruption or dissolution of the system by way of internal upheaval or ineffectiveness against external challenge (p. 495).

In other words, a system must have at its disposal a set of responses equal to the challenges it will face. Only variety in a challenged system's behavior can allow it to reduce the variety in its outcomes, that is, to produce the particular outcomes it desires. Only veriety can destroy variety. Another way of saying this is that the greater the challenges a system faces, the greater must be the variety at its disposal to deal with them successfully. In a placid environment, very little variety is required, but in a turbulent one, a great deal is required.

Ashby (1968a) states that the forms that social systems take are "dominated by the basic law of requisite variety, in that achieving an appropriate selection of responses is "absolutely dependent" on the

processing of at least a related quantity of information (p. 118). The system needs a particular quantity of information to meet a challenge, and it must process it so that its own response capabilities are broadened appropriately.

Variety comes into a system in two forms. There is that which threatens survival, and which must be blocked at all costs. And there is that which can be transformed and used to block the effect of the other. The latter type is useful to the system, of course, and should be made as large as possible, for " by the law of Requisite Variety, the amount of disturbance (that reaches and affects the system) can be diminished only by the amount of information so transmitted" (Ashby, 1968b, p. 301).

This is not just theoretical speculation. Stafford Beer, a very successful and internationally famous management consultant, employes the variety concept extensively and practically. He notes that failure to understand and act on the concept is one of the key problems of control in a firm.

> For management always hopes to devise systems that are simple and cheap, but often ends up by spending vast sums of money to inject requisite variety -- which should have been designed into the system in the first place (Beer, 1972, p. 54).

He also observes that, "The scale of the variety problem within a firm is of crucial importance" (ibid.).

One can conclude from this discussion that the matter of bringing outside information into a social system, such as a school district, and getting it used appropriately is not merely a matter of convenience or desirability. It is a matter of "critical importance," and the greater the environmental challenges the system faces, the more critical the matter becomes.

Getting Outside Information Used by Social Systems. Bringing needed outside information into a social system is not so straightforward as one might hope, given the need established in the preceeding section. Systems have boundaries, and one of the ways they maintain their integrity is to defend them. For human organizations, the amount of interaction with the outside can be thought of in terms of the permeability of the organization's boundaries (Brown, 1973, p. 239). The degree and kind of permeability affects directly the organization's ability to adapt to its environment.

Thus we have a paradox. A social system must maintain its boundaries to defend its integrity, but at the same time it must be open to outside information -- that is, it must allow its boundaries to be permeated. These two needs are in conflict, and achieving a balance is one of the most serious problems any system faces.

There is no doubt that systems which perceive themselves as under threat tend to become defensive; they tend among other things to guard their boundaries more closely and make them less permeable. This reaction is understandable, but in particular circumstances, it is self-destructive. Given the kind of environment which now exists and the challenges it presents, such a defensive reaction is very likely to occur. Outside information and influence is shut off, and unorthodox behaviors decrease.

Goodlad (1979) comments that this type of defensive reaction is occurring now in much of our educational system.

> ...the less tenable long-established principles come to be, the more intense the ceremonial rain dances by those who fear the personal consequences of new ones. That is, threatened groups and individuals try harder to do what gave satisfaction before, however inappropriate and outworn the behaviors may be... We are a badly divided profession, with each segment perceiving only a part of the whole, lacking awareness of and commitment to the systemic, collaborative functioning required for significant improvement (pp. 345-346).

Outside information is needed to satisfy the law of requisite variety, but given the seriousness of the challenge and the related defensive behavior, what mechanism for bringing information in is likely to work?

Brown (1973) notes that the manner in which an organization determines the kind and amount of information allowed to cross its boundaries relates to the norms, values, and subculture of the organization. Those persons who have accepted membership in the organization --and share its norms, values, and subculture -- " will perceive and interpret various pieces of information differently from non-memebers" (P. 241). Such effects occur not only when the information crosses an organization's boundaries, but also when it is passed among various members with differing organizational roles.

If the source of a particular item of information is from an organizational member, this person is much more likely to be broadly

perceived as sharing the organization's norms, values, and subculture than an outsider, and the information is more likely to be accepted and acted on. This effect is operational at any time, but note that it becomes more pronounced as environmental threats to the organization increase.

The need for the source to be broadly perceived as part of the membership is very important. We are all familiar with the classic division of organizational management and decision making into technical, managerial, and strategic categories. Each of these has a different time perspective and substantively different responsibilities. Each needs external information, but the content of the information varies substantially with the role of the user.

In relation to this problem, Brown (1973) refers to three types of "intelligence mechanisms," and he suggests the terms "filters," "screens," and "sieves" to refer to them. Filters provide the information from the environment needed for the technical decision-making level; screens bring in managerial level information; and sieves provide the information needed for the strategy or policy-making level (p. 244).

He also suggests that a single unit within the organization be given the responsibility for meeting all three information needs.

> Each of these intelligence mechanisms must be allocated enough organizational resources to carry out its own function. If the intelligence function is assigned as a secondary mission to a subpart of the organization, it is not surprising if much relevant information never gets into the appropriate channel. Such a group (one assigned as a secondary mission) will probably not have the resources or expertise to evaluate such things as the impact of new technical development upon the organization's formal and informal structures (p. 244).

The "linker," or whatever we choose to call the unit operating the intelligence mechanisms, must understand the intricacies of the organization's structure and its operation and must be capable of evaluating needs, both in terms of substance and of delivery format, of the different decision levels.

A highly specialized group clearly is required to perform in this way. This group should provide a clearing house for information flows, and it should have as its primary responsibility the integration,

evaluation, and comparison of the various kinds of information coming into the organization.

Review for a moment the points made in the last few pages:

- The import into and proper use of outside information is critical to a social system's survival and to its ability to engage in goal-directed behavior. As environmental challenges increase, the need for information also increases.
- There are distinctly different levels of responsibility within an organization. Each level requires outside information, but the specific needs of each are very different.
- Information is more likely to be accepted and used if the user perceives the supplier as sharing the norms, values, and sub-culture of the organization.

These three points make almost inevitable the conclusion that the unit to meet these information needs must be within the organization. It must be "trusted," so that it can engage in the necessary boundary-spanning activities, and not provoke defensive reactions. It must know the role specifications and eccentricities of a wide range of users, so that it can deliver information which they need and will use. It must be an integral part of the organism; otherwise, it cannot possibly perform in this manner.

IV. Applications to Education

What does all of this have to do with education? At the start of this paper is a proposition which suggests it has a great deal to do with education:

> In the current environment, internal linkage agents are more effective in inducing knowledge utilization in education systems, other things equal, than are external linkage agents; and, in general, the relative advantage of the internal linkage agent varies directly with the turbulence of a system's environment.

The arguments advanced in the preceding sections appear to the writer to be very strong. But the validity of the proposition depends, of course, on how one defines "linkage agent." The term is defined

in this paper as a person or agency which promotes knowledge utilization in educational organizations. We could now get into a discussion of what "promote" means, and probably continue on into an infinite definitional regress.

Everyone knows what the issues really are, however. The problem is to cause change in educational organizations so that they can deal with their own challenges, improve their practices, and assist the society in getting safely through the difficult period ahead. The problem is to avoid a situation in which, in Heckinger's (1979) words, the public schools are "left with only the poorest and the most deprived, as they were before the process if educational democratization began a century ago" (p. 22). "At the end of that road," Heckinger says, "is the graveyard of the American dream" (p. 22).

How do you get people in the schools to accept new ideas and to act on them? There has been a lot of talk in recent years about "dissemination" and "diffusion," and much of the thinking about these processes in education has been drawn from the agricultural extension agent model. A lot of the "change agent" role conceptions have been drawn from this model; that is, change agents have been conceived as "external" linkage agents. This paper is intended (perhaps presumptiously) to deal a mortal blow to the belief that this approach can successfully cause knowledge utilization and change within the elementary and secondary schools.

To be fair, many people who support the notion of an external linkage agent make no claim that the role can accomplish such outcomes. Lipman (1977), for example, discusses both external linkage agents (e.g., consultants) and internal linkage agents (e.g., administrators), and he assigns to them different responsibilities.

> To implement educational improvement, one must develop needed and appropriate linkages both within the school and between the school and the established and emerging institutions, agencies, and groups which support educational innovation -- the school district, intermediate educational agencies, regional leagues and teacher centers, private educational enterprises, state departments of education, teacher education institutions, multi-state consortia and compacts, and national and international agencies and professional organizations (p. 119).

What he is saying is that there can be different kinds of

linkers or linkage agents, and he is absolutely correct in his contention that the total system needs to be more tightly integrated. To go back to one of Haughey's (1979) points, however, it is very ambiguous to have "linkage agent" refer to so many roles in this large and complex linkage system. In fact, trying to make it mean so many things runs the risk of making it in reality mean nothing.

Dick Brickley has prepared a paper defending the concept of external linkage agent, and we are going to engage in a sort of debate at the presentation. It is really a pseudo debate, however, because of the definitional problems; in a large sense, it will be what is referred to as a semantic argument. What we hope to accomplish is a clarification of the issues and a realization that more rigor is needed in the language used to discuss this field.

Education and the Agricultural Agent Model. Given this caveat, let us proceed to see how some of the concepts apply in education.

A number of authors (Blumberg and Schmuck, 1972; Arends, 1973; Derr, 1976) have noted that there are key attributes of school systems which differentiate them from other types of organizations. Miles (1965) identifies and comments on seven:

1. Goal ambiguity. It is usually not certain what the real goals of education are, nor whose goals apply.
2. Input variability. There is a very wide variation in input from the environment, particularly in relation to children and personnel. Expectancies, therefore, are difficult to establish.
3. Role performance invisibility. "Classrooms are in effect the production departments of the educational enterprise; in them teachers teach. Yet, this role performance is relatively invisible to status equals or superiors" (pp. 238-239). Reinforcement for good performance is therfore uncertain.
4. Low interdependence. The parts in a K-12 educational system are "loosely coupled:" that is, the functional relationships among different system components are relatively weak.
5. Vulnerability. The schools are not able to maintain their boundaries as well as most other organizations; they are especially vulnerable to outside control attempts, criticism, and a wide variety of demands from the surrounding environment.

The law of requisite variety impinges on them heavily.

6. Lay-professional control problems. Everybody seems to be an expert in education, and "the public schools are governed by laymen, most of whom have not been inside a school for twenty years prior to their succession to the board" (p. 241). This is another aspect of the boundary maintenance problem.
7. Low technological investment. The amount of technology per worker in the schools is low, and, as a consequence, social transactions rather than sociotechnical transactions come to be the major mode of organizational production. As a result of this and some of the other attributes, professionals in K-12 education are reinforced largely by social transactions with their peers rather than by their degree of productivity. One would therefore expect the sharing of norms, values, and subculture to be a stronger mediating influence in school systems than in most other organizations.

Given these characteristics, the schools clearly require a customized approach to knowledge utilization. The generalizations of information use in social organizations apply, of course, but they must be considered in light of the particular attributes of educational systems.

The situation is so different from that of the agricultural extension agent that one wonders why the notion of applying this role to education has been taken so seriously. Consider, for example:

- The agricultural extension agent is dealing one-on-one with individual farmers, not with social systems. The system he deals with is a single human being, not complex groups interacting in complex ways. Boundary maintenance concerns are of a very different order.
- The rewards the farmer receives are a direct function of his productivity. If the extension agent can help him to produce more, and if he has any intelligence at all, the farmer will pay attention to and use knowledge provided by the agent. His rewards depend on it. Rewards in education do not depend directly on using knowledge. The reinforcement mechanisms make the two situations fundamentally different.
- The farmer's products are things, not people, and this is a very basic point. It is like the difference between the physical

and social sciences. The former deals with phenomena which, by nature, are easier to study, easier to experiment with, and easier to understand and control. Producing a higher yield of corn is a problem of a different magnitude and a different essence than increasing the performance of kids in the inner city.

The Educational System and Defensive Behavior. The second part of the proposition states that "the relative advantage of the internal linkage agent varies directly with the turbulence of a system's environment."

Given the ideas laid out above, this notion is easily defended. Several investigators have examined a social system's informational behavior under conditions of threat, when the variety proliferates so rapidly in the environment that the system becomes overloaded. Danger occurs when response capabilities are not equal to the challenge, and disequilibrium and even extinction are real possibilities.

Meier (1973) lists several types of responses that have been observed:

- Queuing, that is, trying to deal with things in serial order.
- Priorities in queues; dealing with things serially, but placing them in order according to perceived importance.
- Destruction of low priority inputs; deciding to do away with things which seem less important.
- Omission; simply ignoring some things.
- Reduction of processing standards; lowering intended quality.
- Decentralization; giving part of the responsibility to someone else.
- Formation of independent organizations near the periphery; devising multiple channels.
- Mobile reserves; trying to increase the variety available to the organization to deal with the problem.
- Rethinking procedures; dealing with variety through the possibility of restructuring.
- Redefining the boundaries of the system; redefining role and limiting goals.
- Retreat to formal, ritualistic behavior; Goodlad's (1979) ceremonial rain dances.

. Dissolving the larger system, with salvage of its assets into several new, smaller units; instituting a voucher system in education, for example (p. 242).

The actual behaviors a system will choose depends on such things as its flexibility, its previously established resource pool, its ability to create forms (mutations) it has not used before, and the images it has of its internal strength and boundary control. Systems strong in these characteristics will tend toward the more productive responses, while those weak in them will tend toward defensiveness.

Consider again Mile's seven school system attributes listed a few pages back, and consider the other things known about the change process in education. The prediction of defensive responses is inescapable.

As an organization becomes more defensive, it maintains its boundaries more closely and tries to reduce permeability. In this case, it will be more difficult for an outside agent to get information across the boundaries, and the organization will depend more on internal sources. Therefore, we can state that, as the environment becomes more turbulent, the internal linkage agent is likely to be more effective in inducing knowledge utilization.

This does not say that the information should originate inside the organization; the law of requisite variety dictates that this cannot be. Rather, the source of the information used in decision processes must be from within the organization. The internal agent in this case obviously has to link to outside resources, but note that he/she is the one spanning the boundary, and not an outsider.

V. An Empirical Example

The author has been developing these ideas over the last nine or ten years, and about three years ago he had the opportunity to test them in a real world setting. The Alabama State Department of Education asked him to write its proposal for a Capacity Building Grant under the NIE Dissemination Grants Program. The proposal was written from the perspectives outlined above. A grant was awarded, and the author directed the project for the first two years of its operation.

The program, which is going strong today, is called AIDS -- the

Alabama Information and Development System. It was not designed as a research project, and conclusions about it cannot lay claim technically to internal validity nor (therefore) to generalizability. It was a good test, however. Alabama had not had any organized statewide dissemination effort before AIDS began, and thus it was "virgin" territory.

I am certain that the internal linkage philosophy was the driving force behind AIDS because I directed the program's development, full-time, for two years. As Kierkegaard would express it, this is a subjective truth, arrived at existentially (Hartman, 1967, pp. 226-264).

The following three propositions were stated in the initial proposal and were repeated regularly to different audiences, including perspective users:

1. The success of problem solving and improvement efforts in LEA's is directly related to the extent to which decisions in these agencies are based on current knowledge.
2. Local problem solving and improvment efforts, to be successful, must be collaborative in that basic decision-making remains the prerogative of local personnel but appropriate outside resources must be involved.
3. Local problem solving and improvement efforts, to be successful, must take the total organization and its environment into consideration.

The program had these ten stated objectives:

1. Legitimize AIDS within the SDE and establish a permanent dissemination/diffusion unit in the Department.
2. Develop a unified linkage system which will provide for two-way communication among AIDS, SDE staff, and LEA's.
3. Build a centralized system within the SDE for retrieval of resource information needed in problem solving and improvement efforts.
4. Build an intrastate resource base by identifying and validating promising programs and practices in educational agencies in Alabama.
5. Develop awareness among prospective users of AIDS availability, of its purposes, of outcomes which can be expected through its use, and of procedures for initiating its use.

6. Promote the improvement of equality of educational opportunity in the schools of Alabama.
7. Provide training in AIDS operation and utilization to AIDS staff, SDE and LEA linkers, and clients at the state and local level.
8. Provide technical assistance to LEA's in identifying needs and utilizing resource information for problem solving and improvement efforts.
9. Provide for evaluative feedback and for continuous assessment and long range improvement of AIDS.
10. Develop mechanisms and resources within the SDE to insure the continuity of AIDS.

The project began August 15, 1976, and as soon as possible after the office was organized, intensive efforts were undertaken to make the target audience aware of the program and its purposes, and to create an image of a resource available to them, within the educational system. From November, 1976, through the end of calendar year 1978, 165 separate presentations were made throughout the state, and 7,635 people attended, as follows: 623 SDE staff; 308 higher education staff; 1,413 professional organization representatives; and 5,291 local school system staff. Statewide awareness surveys were conducted in the spring of 1977 and again in 1978, a year later. A random sample of teachers, principals, and superintendents was used. One question was, "Have you heard of the Service within the SDE called AIDS?" and the percent answering "yes" each year is shown in Table 1.

Table 1

Percent of Teachers, Principals, and Superintendents Aware of AIDS

Group	Spring 1977	Spring 1978
Superintendents	92%	96%
Principals	16	67
Teachers	12	50

Assuming that the respondents answered honestly, these results are

rather dramatic. Remember that the first awareness efforts were begun at the end of November, 1976. In about 18 months, half of the teachers, two-thirds of the principals, and almost all of the superintendents had become aware of the effort.

To enhance the perception of AIDS as an internal resource, an LEA linker program was begun. In January, 1978, superintendents who had indicated high interest in AIDS in a prior survey were invited to appoint a linker within their system. The program began with a one-day orientation and training meeting in April. Staff was assist by Joe Pascarelli, now of the Northwest Educational Development Laboratory; Richard Brickley of Research and Information Services in Education; David Crandal of The Network in Massachusetts; and Ronald Havelock, at the time an NIE fellow.

In the current school year (1978-1979), 44 public school systems and two Catholic parochial systems in the state have linkers. There are 127 public systems in Alabama, so 36.6 percent are involved in the linker program in its first year.

There have been a number of training events for different audiences. "Training" is defined as an experience of at least one day's length in which the object is to develop specific skills needed for the definition, retrieval, and use of information -- as contrasted with "Orientation," where the object is simple awareness. Forty seven such sessions have been held, and 963 persons, including 495 from local systems, have attended. Five of the sessions were specifically for LEA linkers.

AIDS began accepting requests for service in December, 1976, and from the beginning, the number of requests received exceeded expectations. In year one, 346 requests were received; in year two, 1,575 were received; and through the first four months of the 1978-1979 school year, 1,502 were received. The number of requests, by client group and year, is shown in Table 2 on the following page.

At the current rate, requests this school year will exceed 4,000. Keep in mind that this has all occurred since December, 1976. In a state not always noted for being at or near the top in educational practice, these results seem to the author to be close to phenomenal.

Table 2

Requests for Information Services,
By Client Group and Year

Client Group	1976-1977* Number	1976-1977* Percent	1977-1978 Number	1977-1978 Percent	1978-1979* Number	1978-1979* Percent
LEA's	142	41.0	1,055	67.0	1,311	87.3
SDE	133	38.4	205	13.0	75	5.0
Two-Year Colleges	6	1.7	63	4.0	91	6.1
Other	65	18.9	252	16.0	25	1.6
Total	346	100.0	1,575	100.0	1,502	100.0

*Last six months of 1976-1977,
first four months of 1978-1979.

Search requests by quarter and by user group are illustrated in Figure 1, on the following page. The figure demonstrates that, at least in terms of requests received and serviced, the primary target audience, local school systems, is being reached. Two-year colleges are included because they are under the State Department of Education in Alabama. Use there has picked up, too. The greatest disappointment is with the State Department of Education staff. Despite repeated attempts through both orientation and training to involve them, as a group they have not seen the value of the system. (There are individual exceptions, of course.) One would think that, in their roles as consultants to local districts, they would recognize the value of immediate and easy access to a gigantic resource base. This problem bears study in itself, no doubt.

It should also be noted that, in the effort to unify information services within the sytem, AIDS became Alabama Facilitator in the National Diffusion Network (NDN) in the summer of 1977. The object in NDN is to get "adoptions," that is, to get complete instructional programs (as contrasted with smaller information packages) into school systems from the outside. This is, of course, simply another aspect of knowledge

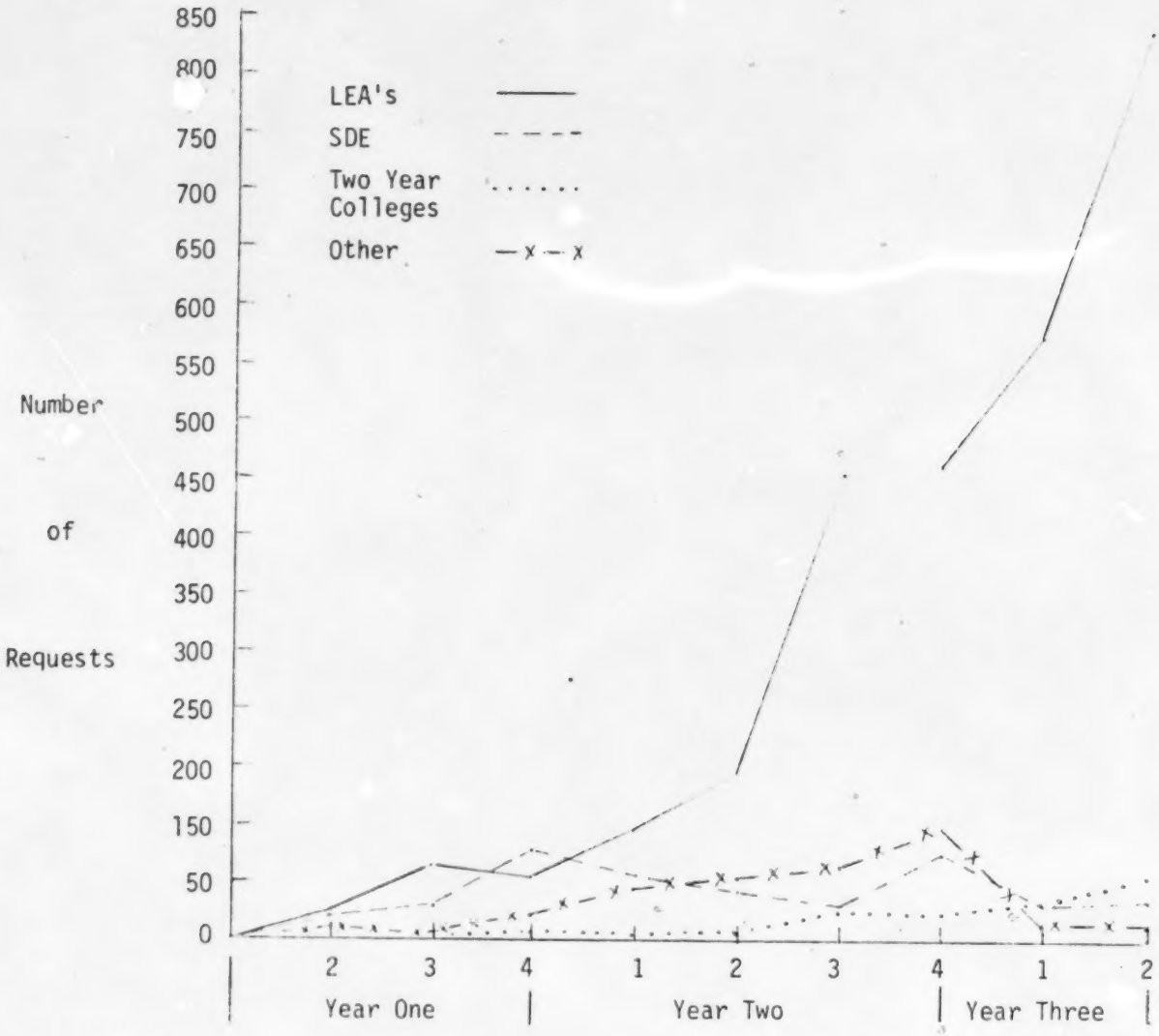

Figure 1

Search Requests Received
By Quarter

utilization.

In its first year in NDN, AIDS had 30 adoptions in Alabama schools, and in the current (second) year, 45 are projected. These figures are much higher than the national average, in number of adoptions per capita enrollment.

Discussion of the AIDS Experience. To what extent do these results support the argument for internal linkage? The evidence they give is circumstantial and subjective. The figures were gathered as part of an evaluation (as contrasted with a research) design, and they can in no way be said to establish causal relationships, scientifically. During the current year, a research project is being conducted jointly with Auburn University to produce more solid scientific evidence, but the data are just now being gathered.

Lacking internal validity (Campbell and Stanley, 1963), the results can be interpreted in alternate ways. One might hypothesize, for example, that the unusually high use figures result from the intensive awareness efforts, rather than from the attempt to establish the image of an internal resource. The low use figures in the SDE suggest this interpretation in a way. But there have also been intensive awareness efforts there, and whether or not a unit is internal to a system, socially and psychologically, is a matter of perception. As noted above, more research is needed.

It might also be noted that the figures simply reflect the requests for service and the delivery of information, and they say nothing about its use. Pumping data into a system does not necessarily help with the variety problem; whereas, providing information to decision makers in a way that bears on their actions does (Beer, 1973, p. 31). There is no answer to this latter criticism. At this point, we have no evidence that Alabama schools are more successful in responding to environmental challenges because of the existence of AIDS.

Nevertheless, we do have the evidence of an unusually successful experience. The situation was approached from a particular theoretical position, and the results, while currently at the surface level, establish that a great deal of necessary (if not sufficient) activity has occurred. This is much stronger support for the proposition than if there was no theoretical backing, and it provides confidence, if not

scientific proof.

VI. Conclusion

This paper presents an argument in support of the propositions that internal linkage agents are more effective in today's environment than are external linkage agents, at least in education, and that their relative advantage increases as turbulence in the environ- increases.

Given the definition of linkage as a process of promoting knowledge utilization in educational organizations, a strong case, we believe, has been made. Several generalizations have been drawn which need to be taken seriously by those involved in educational dissemination and/or diffusion efforts.

Apparent conflict between "internal linkage" and "external linkage" is in part a semantic problem, and this relates to one of the significant needs in the field. The ambiguity of terminology needs to be eliminated, so that more concise discussion is possible.

The area is too important to allow this situation to continue. There is no doubt that knowledge utilization is more than a matter of convenience or desirability. It is a critical matter which relates directly to an organization's survival and its ability to achieve its goals. In this age of transition, it may well determine the fate of public education.

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